PCT/GB 00/00621
09/914473

The Patent Office

INVESTOR IN PEOPLE

GB00/621

REC'D 14 MAR 2000
WIPO PCT

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

Signed Andrew Gersey

Dated 3 March 2000

Patents Act 1977
(Rule 16)

OFFICE
-3 M 999
RECEIVED BY POST

The Patent Office

03 MAR 1999
03MAR99 E429499-1 D02901
P01/7700 0.00 - 9904760.7

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference

W0104

2. Patent application number
(The Patent Office will fill in this part)

9904760.7

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

CROWN CORK & SEAL TECHNOLOGIES CORPORATION
11535 S. CENTRAL AVENUE
ALSIP
ILLINOIS 60803-2599
USA

Patents ADP number *(if you know it)*

If the applicant is a corporate body, give the country/state of its incorporation

UNITED STATES / DELAWARE

7372170001

4. Title of the invention

CLOSURE SEALING WAD

5. Name of your agent *(if you have one)*

DEBRA JANE CLARE SMITH

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

CARNAUDMETALBOX PLC
DOWNSVIEW ROAD
WANTAGE
OXFORDSHIRE
OX12 9BP

Patents ADP number *(if you know it)*

6264816002

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*
-	-	-

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application		Date of filing *(day / month / year)*
-	-	-

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*
a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

YES

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	-
Description	17
Claim*(s)*	2
Abstract	1
Drawing*(s)*	4 +4

10. If you are also filing any of the following, state how many against each item.

Priority documents	-
Translations of priority documents	-
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	-
Request for preliminary examination and search *(Patents Form 9/77)*	YES
Request for substantive examination *(Patents Form 10/77)*	-
Any other documents *(please specify)*	-

11. I/We request the grant of a patent on the basis of this application.

Signature Debra J C Smith Date 2/3/99

DEBRA JANE CLARE SMITH 2 March 1999

12. Name and daytime telephone number of person to contact in the United Kingdom

MS D J C SMITH 01235 402656

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.

b) Write your answers in capital letters using black ink or you may type them.

c) If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.

d) If you have answered 'Yes' Patents Form 7/77 will need to be filed.

e) Once you have filled in the form you must remember to sign and date it.

f) For details of the fee and ways to pay please contact the Patent Office.

CLOSURE SEALING WAD

This invention relates to sealing wads or liners for use in closure caps. The invention is particularly suitable for use with ROPP (Roll-On Pilfer Proof) closures and in conjunction with pourers or non-refilling devices fitted inside the bore of a container neck.

A sealing wad or liner is often used in association with known closures. Generally, such closures have a plane crown, to cover the container mouth, and a tubular skirt which depends from the periphery of the crown and is adapted to locate on the outside of the container by, for example, threaded engagement. A sealing wad or liner is received adjacent to the closure crown to provide a seal around the mouth of the container.

In an ROPP closure, a capsule made of thin metal is removably attached to the container. The capsule is fitted in position on the container neck and thread formations are rolled into the capsule skirt, conforming automatically to the underlying threads on the container to provided the necessary threaded engagement between the two. At the same time as the thread is formed, the free edge of the skirt is usually rolled inwardly under an annular shoulder on the container. This, in combination with a line of weakening provided around the periphery of the skirt, forms a tamper evident or security band. When the closure is unscrewed for the first time, this band separates from the remainder of the closure along the line of weakening, thereby providing visual evidence that an attempt has been made to open the container.

A waxed, cardboard sealing wad is usually provided in conventional ROPP closures. The sealing wad is retained in the capsule by means of an annular retaining bead formed around the periphery of the closure skirt, adjacent to the crown. When the container is capped, the mouth of the container locally deforms the cardboard sealing wad, to provide a seal. However, cardboard sealing wads are not always suitable, particularly when the container is provided with a device that is designed to be substantially or wholly received in the neck of the container; hereinafter referred to as "in-bore" devices. Such devices include, for example, pourers and non-refilling devices for insertion in containers of fine spirits.

Accordingly the present invention provides a closure liner adapted to seal a container opening when a closure containing the liner is applied to the container, characterised in that the liner comprises a sealing flange arranged to overlie the rim of the container opening and a biasing means arranged to bias the periphery of the sealing flange against the outside edge of the rim of the container opening when the closure is applied to the container.

In particular, the invention provides a means of improving the seal between a closure and a container fitted with an in-bore device, such as a non-refilling device.

Various proposals for in-bore, non-refilling devices are described in Patent Publications US 4258854, GB 2026428, WO 96/04179 and WO 98/42587. In US 4258854, WO

96/04179 and WO 98/42587, the housing of the non-refilling device is provided with an annular flange which is arranged to overlie the rim of the container. The annular flange acts as a closure liner and provides a seal when the closure is fully tightened onto the container. The annular flange is adapted to releasably engage with the main body of the non-refilling device. Thus, the in-bore device can be assembled inside the closure cap prior to delivery to the bottling line. The combined closure and in-bore device can then be applied to the container neck as a single unit, reducing the time required to cap the bottles.

A disadvantage of this arrangement is that it is difficult to obtain as good a seal as can be achieved using the conventional cardboard wad. This causes particular problems when the filled bottles are being transported or stored in adverse conditions, such as hot and humid conditions. However, use of a conventional cardboard wad in conjunction with a non-refilling device is considered unacceptable as the closure has to be applied to the bottle independently of the in-bore device which increases process times and costs.

Therefore, the present invention also aims to provide an in-bore device, such as a non-refilling device, having the advantages of the existing in-bore devices but with improved sealing performance. The device must be capable integration with the closure or capsule for delivery to the filling line, relatively cheap and easy to mould and easy to assemble, but should seal the

container opening as well as a closure containing a conventional cardboard wad.

Accordingly, the present invention also provides an in-bore device for a container, having a body portion, at least part of which is adapted to be held firmly in the neck of a container, and a liner portion arranged to co-operate releasably with the body portion, the liner portion having a sealing flange arranged to overlie the rim of the container opening to provide a seal when the in-bore device is applied to the container, characterised in that the liner portion further comprises a biasing means arranged to bias the sealing flange against the outer rim of the container opening.

The liner according to the invention is preferably made of a plastics material. When used in conjunction with an in-bore device, the liner is provided with means for releasable engagement with the body portion of the in-bore device. This releasable connection may be provided, for example, by a snap fit arrangement or by frangible bridges, which break on first opening of the container. The in-bore device and liner may be inserted into the closure cap and the resultant integrated unit provided to the bottling line for insertion into the neck of a container. The biasing means forces the periphery of the liner against the outer rim of the container opening, improving the integrity of the fluid seal.

Preferably, the biasing means is provided as an integral part of the liner as this reduces assembly time and costs. Where the liner is made from a plastics

material, the biasing means is preferably integrally moulded with the liner.

The biasing means may be provided by an upstanding ridge around the periphery of the liner, between the opposed surfaces of the liner and the crown of the closure. As the closure is applied to the container, the force applied to the closure crown during the capping process compresses the upstanding ridge and forces the periphery of the liner around the outside edge of the rim of the container opening, thereby providing a seal. The ridge may be segmented or shaped to provide the required force distribution. Where the closure crown is made from a thin, deformable material, such as in an ROPP closure, the ridge preferably has a smooth contour which gradually blends into the surface of the liner. This reduces the risk of producing a witness mark on the crown of the closure during the capping process.

Where the liner material has insufficient internal resilience, the biasing effect may be enhanced by providing a structure around the periphery of the liner, which is configured to give a spring characteristic. For example, the structure may be folded or looped so that it acts like a simple compression spring. As the closure is applied to the container, the spring bias in the structure provides the biasing force required to force the periphery of the liner around the outside edge of the rim of the container. In this arrangement, the biasing effect is not wholly reliant on the inherent resilience of the liner material. This is particularly important where the liner is made from a relatively rigid material

due to the need to provide engagement means on the liner, so that it can be releasably connected to an in-bore device, for example.

A thin upstanding rim arranged between the opposed surfaces of the crown of the closure and the liner is effective in providing an additional spring bias effect. On application of the closure to the container, the upstanding rim is folded down towards the rest of the liner by the force exerted on the crown of the closure. In its folded configuration, the rim acts like a folded spring and biases the periphery of the liner around the outside edge of the rim of the container opening.

Preferably, a spacer is provided between the opposed surfaces of the crown of the closure and the liner. The spacer may take the form of an upstanding boss, a number of discrete upstanding bosses or an annular ridge. Preferably, the spacer is a solid boss which extends over substantially the whole surface of the liner, in order to reduce the risk of witness marks appearing on the crown of the closure during capping.

Where the biasing means is provided as an upstanding rim around the periphery of the liner, the spacer preferably defines a cavity into which the rim can fold during capping. Again this ensures that the surface of the liner does not give rise to witness marks on the crown of the closure during capping. Additionally, the spacer may be designed to prevent the fold, between the rim and the periphery of the liner, from buckling and folding completely flat. If the fold is completely

flattened the additional spring bias effect will not be achieved.

All these configurations provide an effective seal by wrapping the periphery of the liner around the outside edge of the rim of the container opening. Furthermore, these liner configurations are simple to mould and may be provided in addition to other features such as engagement tabs for connection of the liner to an in-bore device.

The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

FIGURE 1 shows a side section view of a conventional ROPP closure fitted to a bottle.

FIGURE 2 shows a side section view of an ROPP closure having a liner according to the invention, fitted to a bottle.

FIGURE 3 shows a side section view of a known in-bore, non-refilling device inserted in the neck of a bottle and surrounded by a ROPP closure.

FIGURE 4 shows a side section view of the same in-bore, non-refilling device shown in Figure 3, with a modified liner according to the invention.

FIGURE 5 shows a side section view of a liner according to a first embodiment of the invention.

FIGURE 6 shows a side section view of a liner according to a second embodiment of the invention.

FIGURE 7 shows an isometric view of the modified liner shown in Figure 4, in its as-moulded configuration.

FIGURE 8 shows a side section view of the modified liner shown in Figure 5.

FIGURES 9A to 9D show the liner of figures 4, 7 and 8 in its as-moulded configuration, first and second partially compressed configurations and with the closure fully fitted on the container respectively.

Where possible in the drawings, like components have been given the same reference numerals.

Referring to the prior art shown figure 1, a bottle 1 is fitted with a capsule or shell 2 of the well-known ROPP variety. The capsule is stamped from aluminium and has a generally planar crown 2A and a tubular skirt 2B. Near its free end, the skirt has a circumferential line of weakening 3 comprising a number of slits. This line of weakening defines a tamper evident band 4, which is retained on the bottle when the remainder of the capsule is removed. A small annular retaining bead 5 is formed around the skirt 2B at a small distance from the crown 2A. In conventional ROPP closures of this type, a cardboard wad 6 is provided to seal the neck of the bottle 1. The wad 6 is retained adjacent to the crown 2A by the retaining bead 5.

The neck of the bottle 1 has a generally cylindrical exterior surface with a stop bead 7 defined thereon. The stop bead 7 engages with the retaining bead 5, to define the axial position of the capsule on the bottle. The finish portion of the bottle 1 also has screw threads 8, a recess 9 arranged to align with the line of weakening 3 on the capsule, and a shoulder 10.

The capsule 2, with the retaining bead 5 already formed and the wad 6 inserted, is placed over the neck of the bottle 1. A tool is then rolled around the tubular

skirt 2B of the capsule in the region of the screw threads 8 on the bottle, to form complimentary screw threads 11 in the capsule 2. The free end of the tubular skirt 2B is curled inwardly below the shoulder 10, to retain the tamper evident band 4 on the bottle 1 and to remove the sharp edge. When the capsule is opened, the unscrewing action fractures the line of weakening 3, severing the tamper evident band 4 from the rest of the capsule. The tamper evident band 4 is retained on the neck of the bottle by the shoulder 10, when the rest of the capsule 2 is removed.

Figure 2 shows the same ROPP closure as figure 1 with a liner 6 modified according to the invention. The liner 6 comprises a flange portion (not labelled) which extends over the rim of the opening in the bottle 1. The flange portion has an upstanding rim 40 around its periphery, which is folded as the ROPP closure is applied to the container. A raised central boss or annular rim 42 acts as a spacer to ensure that the fold between the rim 40 and the flange portion of the liner 6 does not collapse completely flat. The central boss 42 also defines an annular recess into which the rim 41 can fold. This presents a substantially smooth surface to the underside of the capsule crown 2A, ensuring that witness marks do not appear on the surface of the crown 2A during capping.

The folded rim 40 applies a biasing force to the periphery 41 of the liner 6, pushing the periphery 41 around the outside edge of the rim 12 of the container opening. By curling the periphery 41 of the liner around

the outside edge of the rim 12, the sealing performance of the liner is improved. The spring bias of the fold increases the biasing force on the periphery 42 of the sealing flange, compared to a liner which relies purely on compression of the liner material to provide the necessary sealing force. This is particularly important where the liner material has to be relatively hard, due to other design considerations such as the requirement to provide snap beads to allow the liner to be releasably connected to an in-bore device.

Referring to the prior art shown in figure 3, a glass bottle 1 is fitted with a known in-bore, non-refilling device 20. These devices are often used in bottles of fine spirits, such as Scotch Whisky. The non-refilling device 20 is held captive inside the neck of the bottle by a number of flexible outwardly projecting fins 21. The device 20 generally comprises a housing which has upper and lower parts 22, 23 respectively, joined together by frangible bridges 24 of smaller cross sectional dimension than the remainder of the housing. A valve member 25 is held captive within the housing 22,23 and is adapted to engage with a valve seat in the housing, to prevent refilling of the bottle. The frangible bridges 24 are designed to rupture, should someone try to tamper with the action of the valve member 25 and thereby refill the bottle.

The non-refilling device 20 also comprises a liner 30. The liner 30 is generally in the shape of a corrugated disc, having an elevated outer flange 31 with a downturned free edge 32. Adjacent to and inside the

outer flange 31, the liner has an upwardly open peripheral groove 33. The groove 33 and flange 31 define a recess 34 in which the rim of the bottle 1 may be received and sealed. In order to enhance the seal between the liner and the rim of the bottle, the underside of the flange 31 may be formed with a number of concentric, compliant and downwardly projecting sealing beads 35. Thus, the seal is formed on the top surface of the rim of the bottle opeining.

The liner 30 also comprises a number of depending catch members 37, which are arranged to co-operate with a complimentary portion 36 on the upper part of housing 22. The catch members 37 and upper part of the housing 22 allow the liner 30 and the main body 22, 23 of the non-refilling device 20 to be releasably connected together.

The, non-refilling device 20 is assembled by connecting the liner 30 to the main body 22, 23. The assembled non-refilling device 20 is then pushed into the ROPP capsule 2 with the liner 30 leading. The downturned edge 32 of the liner 30 snap engages behind the retaining bead 5, which has been pre-formed in the capsule. The assembly of the device 20 and capsule 2 as it appears at this stage, is shown on the right hand side of figure 2. The closure is now ready for use in a bottling plant.

In the bottling plant, the capsule 2 is pushed over the neck of a product filled bottle 1 and the non-refilling device 20 becomes lodged in the neck of the bottle 1 by means of the fins 21 (as shown on the left hand side of figure 2). As previously described, screw threads (not shown) are then rolled into the capsule in

conformity with the screw threads 8 provided on the bottle finish portion and the free edge of the capsule 2 is rolled under the shoulder 10 to secure the tamper evident band 4 to the bottle.

To open the bottle, the user unscrews the capsule 2, leaving the tamper evident band 4 on the bottle. The liner 30 is held captive in the capsule 2 by the retaining bead 5 and is therefore separated from the body 22, 23 of the non-refilling device. When the capsule 2 is screwed back onto the bottle, the liner 30 re-engages with the upper part of the body 22 via the catch members 37.

Figure 4 shows generally the same in-bore, non-refilling device 20 as shown in Figure 3 but with a modified liner 30 according to the invention. The liner 30 has a number of depending catch members 37, arranged to co-operate with a complimentary portion 36 on the upper part of the non-refilling device housing 22.

The liner 30 is generally in the shape of a corrugated disc and comprises a flange portion 31 which extends over the rim of the bottle opening. The flange portion 31 has an upstanding rim 40 around its periphery, which is folded when the ROPP closure is applied to the container. A raised central boss or annular rim acts as a spacer 42 between the crown 2A of the capsule and the sealing flange 31. Spacer 42 is sized to ensure that the fold between the rim 40 and the flange portion 31 does not collapse completely flat. The central boss 42 defines an annular recess into which the rim 41 can fold. This presents a substantially smooth surface to the underside

of the capsule crown 2A, ensuring that witness marks do not appear on the surface of the crown 2A during capping.

During capping, the rim 40 is folded towards the sealing flange 31 by the force applied to the crown 2A of the capsule. The folded rim 40 applies a biasing force to the periphery 41 of the liner, pushing it around the outside edge 12 of the rim of the container opening, to provide an improved seal.

The remaining features of the non-refilling device are the same as those shown in figure 3. The capping procedure is also as generally described in relation to Figure 3.

Figures 5 to 7 show alternative embodiments of a liner according to the invention.

Referring to figure 5, in a first embodiment of the invention, the liner 6 comprises a sealing flange 31 which is sized so that it extends over the peripheral rim of the container opening. An annular ridge 40 is provided around the periphery of the sealing flange 31. When a closure containing the liner is applied to a container, the force applied to the crown of the closure compresses the ridge 40, forcing the periphery 41 of the liner around the outside edge 12 of the rim of the container opening (as shown by dashed lines).

The liner configuration shown in figure 5 may be improved by blending the contour of the annular ridge 40 into the adjacent upper surface of the liner, as shown in figure 6. In its as-moulded configuration, the blended ridge 40 stands proud of the upper surface of the liner 6. However, when a closure containing the liner is

applied to a container, the upstanding ridge 40 is compressed and flattened, forcing the periphery 41 of the liner around the outside edge 12 of the rim of the container opening (as shown by dashed lines). After application of the closure to the container, the liner has a substantially flat upper surface which reduces the risk of producing a witness mark on the visible surface of the closure crown. Obviously, the outside edge of the ridge 40 may be provided with a suitable radius so that it conforms to the radius between the closure crown and skirt.

Both the liner configurations shown in figures 5 and 6 rely on compression of the liner material to provide the necessary biasing force to push the periphery 41 of the liner around the outside edge 12 of the rim of the container opening. However, where the liner is required to have additional features which have to be relatively rigid (such as snap beads to allow the liner to be connected to an in bore device), the liner material is often not sufficiently resilient to provide the necessary biasing force.

Referring to figures 7 and 8, a liner according to another embodiment of the invention, which is suitable for use in conjunction with an in-bore device, comprises a sealing flange 31 which is sized so that it extends over the rim of a container opening. An upstanding rim 40 extends around the periphery of the sealing flange 31. When a closure containing the liner is applied to a container, the force applied to the crown of the closure causes the upstanding rim 40 to fold towards the sealing

flange 31 as previously described in relation to figures 2 and 4.

In its as-moulded configuration (shown in Figures 7 and 8), the sealing flange 31 slopes downwardly towards the periphery of the liner, whilst the upstanding rim 40 is substantially vertical. This configuration ensures that the rim 40 folds during capping and that the periphery of the liner seals around the outside edge of the rim of the container opening (as discussed in relation to figures 9A to 9D below). This arrangement also allows the liner to be retained in a closure by a conventional wad bead.

The liner may also comprise a number of depending catch members 37, arranged to co-operate with complimentary portions on the upper part of an in-bore device. A spacer 42 is provided inside the rim 40, suitably spaced to provide a recess 43 into which the rim 40 can fold. The spacer 42 is also arranged to provide the liner with a substantially flat upper surface to prevent witness marks appearing on the visible surface of the closure crown.

Figures 9A to D show the configuration of the liner in an ROPP capsule at four stages during the capping process. Figure 9A shows the liner in its as-moulded configuration, figures 9B and C show the liner at two intermediate stages and figure 9D shows the liner configuration when the ROPP capsule is fully fitted on the container.

Referring to figure 9A, the liner comprises a sealing flange 31, which extends over the rim of a

container opening. An upstanding rim 40 extends around the periphery of the sealing flange 31. In the liner's as-moulded configuration, the sealing flange 31 slopes downwardly towards the periphery of the liner and the upstanding rim 40 extends substantially vertical to the main plane of the liner. The liner is connected to the remainder of an in-bore device by catch members 37. The assembled in-bore device (only liner shown) is then inserted into an ROPP capsule 2 and the liner snaps behind the annular retaining bead 5, thereby retaining the device within the capsule. The in-bore device is then placed into the neck of a container 1 and the capsule fits around the outside of the container neck. Force is applied to the closure crown 2A to force the in-bore device into the bore of the container opening.

As shown in figure 9B, the force applied to the closure crown 2A forces the lower surface of the sealing flange 31 into contact with the rim of the container opening. This forces the sealing flange 31 into a substantially horizontal configuration and thereby cams the upstanding rim 40 slightly inward from its initial vertical position.

Referring to figure 9C, further force on the closure crown 2A acts on the upstanding rim 40 to push the periphery of the sealing flange 41 around the outside edge 12 of the rim of the container opening and also forces the upstanding rim 40 to fold towards the upper surface of the liner, into the recess left by the spacer 42.

Finally, as shown in figure 9D, the force on the closure crown 2A pushes the crown 2A into contact with the spacer 42. Screw threads conforming to the threads on the container 1 are then rolled into the capsule 2 as previously described. In this fully capped configuration, the closure crown 2A is in contact with the Spacer 42 and the rim 40 is folded towards the upper surface of the liner. The fold between the sealing flange 31 and rim 40 acts in the same way as a folded spring and maintains a sealing force on the periphery of the liner 41. The free end of the rim 40 may be forced into contact with the upper surface of the liner but preferably complete collapse of the fold is avoided. The spacer 42 may be sized and arranged to ensure that complete collapse of the fold does not occur. This ensures that the folded rim 40 acts as a spring, biasing the periphery 41 of the liner around the outer rim of the container opening 12 even when the liner material is relatively rigid.

CLAIMS

1. A closure liner adapted to seal a container opening when a closure containing the liner is applied to the container,
characterised in that
the liner comprises a sealing flange arranged to overlie the rim of the container opening and
a biasing means arranged to bias the periphery of the sealing flange against the outside edge of the rim of the container opening when the closure is applied to the container.

2. A liner according to claim 1, wherein the biasing means is integral with the sealing flange.

3. A liner according to claim 2, wherein the biasing means comprises a ridge around the periphery of the sealing flange, arranged to lie between the opposed surfaces of the sealing flange and the crown of the closure, wherein application of the closure to the container compresses the ridge, thereby biasing the periphery of the sealing flange against the outside edge of the rim of the container opening.

4. A liner according to claim 2, wherein the biasing means comprises an upstanding rim around the periphery of the sealing flange, arranged to lie between the opposed surfaces of the sealing flange and the crown of the closure, wherein during application of the closure to the container the upstanding rim is folded towards the

sealing flange, thereby biasing the periphery of the sealing flange against the outside edge of the rim of the container opening.

5. A liner according to claim 4, wherein the sealing flange further comprises a spacer arranged to lie between the opposed surfaces of the sealing flange and the crown of the closure.

6. A liner according to claim 5, wherein the spacer is adapted to provide a recess into which the upstanding rim can fold.

7. An in-bore device for a container, having a body portion at least part of which is adapted to be held firmly in the neck of a container, and a liner portion, arranged to arranged to be held captive in a closure and to co-operate releasably with the body portion,
the liner portion having a sealing flange arranged to overlie the rim of the container opening to provide a seal when a closure containing the in-bore device is applied to the container,
characterised in that
the liner portion further comprises a biasing means, arranged to bias the sealing flange against the outside edge of the rim of the container opening when the closure and in-bore device are applied to the container.

8. An in-bore device for a container according to claim 7, further comprising a valve means, to prevent refilling of the container.

ABSTRACT

A sealing wad or liner for use in closures which is particularly suitable for use in conjunction with in-bore devices for containers. The liner comprises a sealing flange which overlies the rim of the container opening and a biasing means arranged to force the periphery of the liner around the outside edge of the rim of the container opening when the closure is applied to the container. Preferably the biasing means is provided by a structure which is suitably shaped to provide a spring bias in addition to the inherent resilience of the liner material.

FIGURE 2

FIG. 1.

PRIOR ART

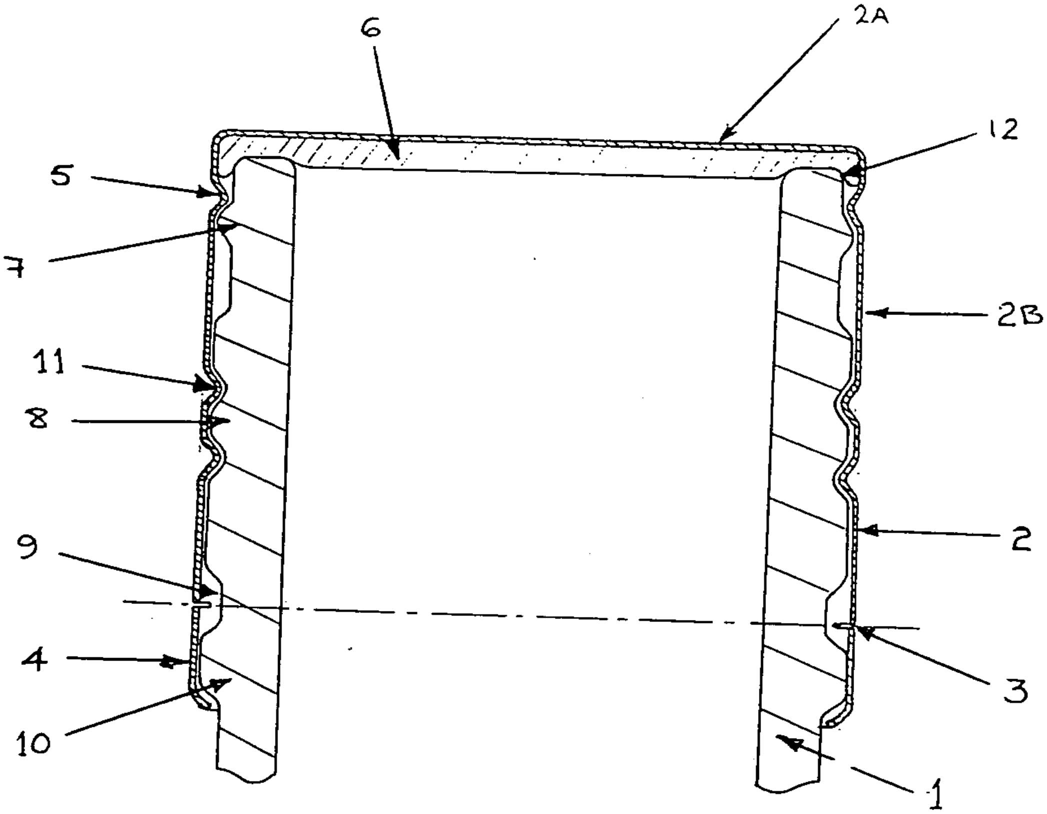


FIG. 2.

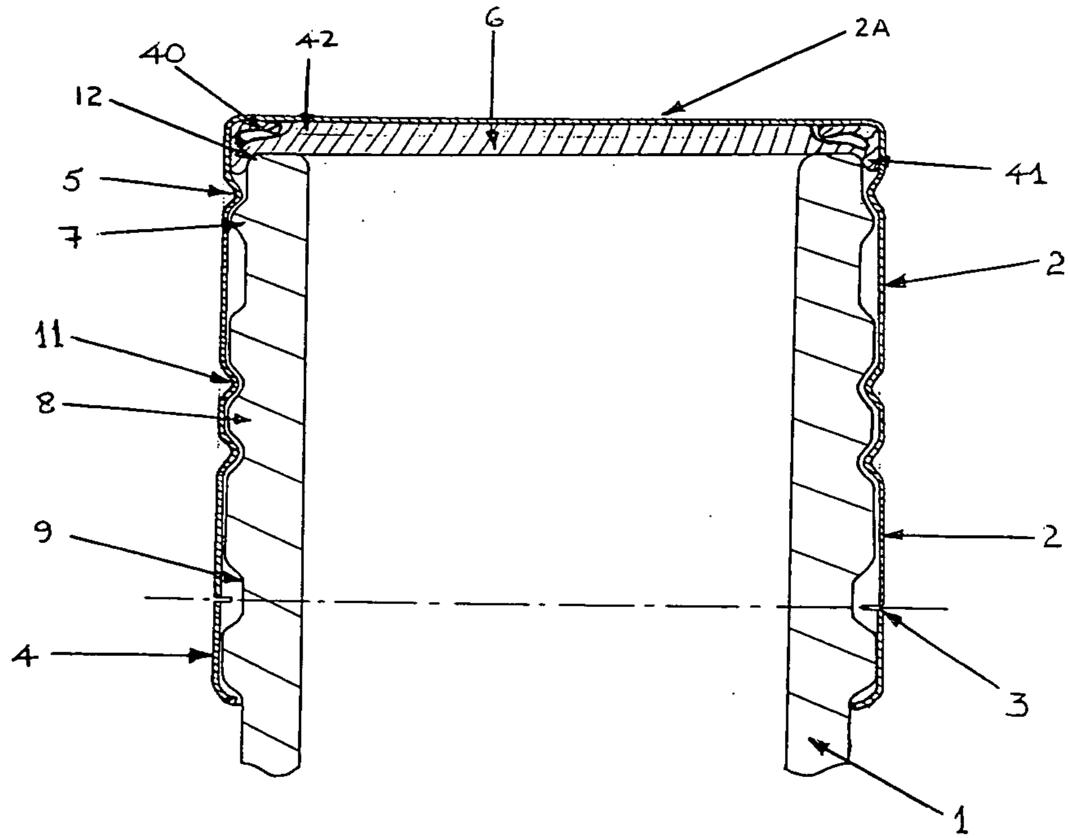


FIG. 3.

PRIOR ART

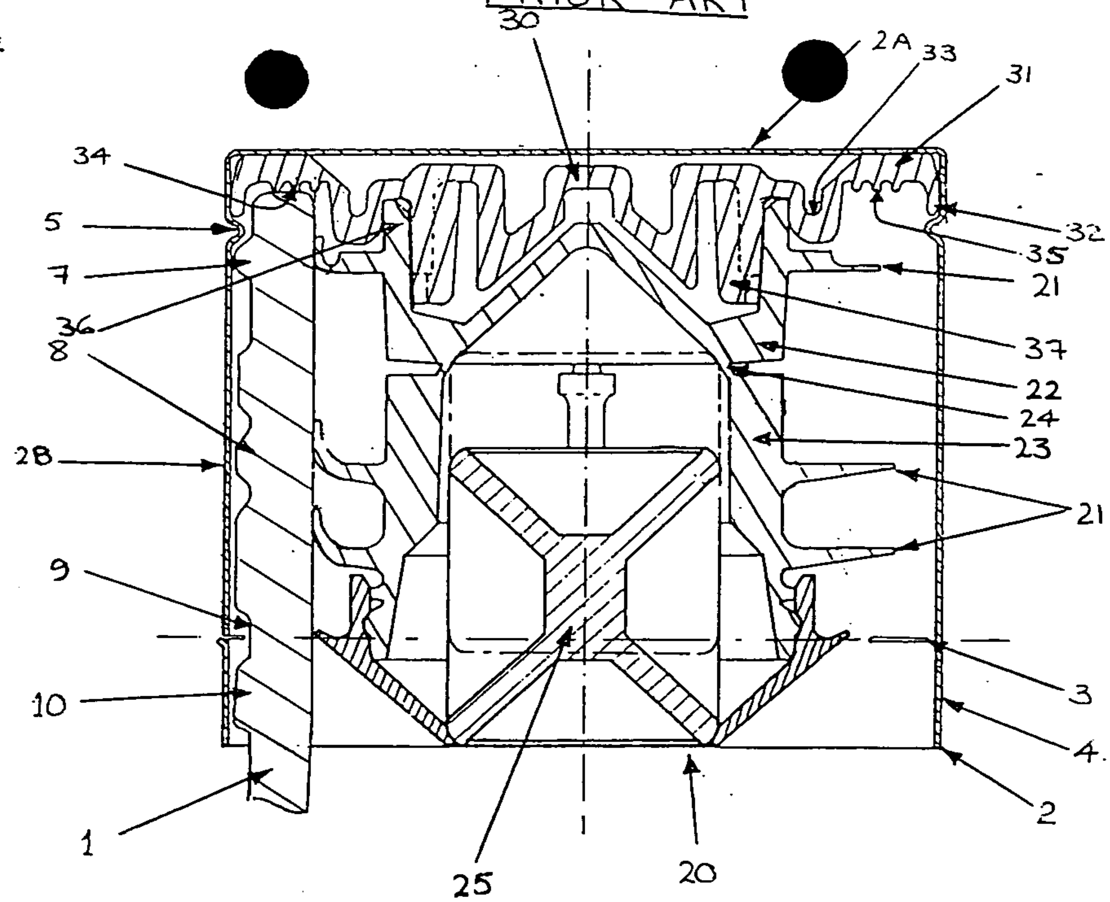


FIG. 4.

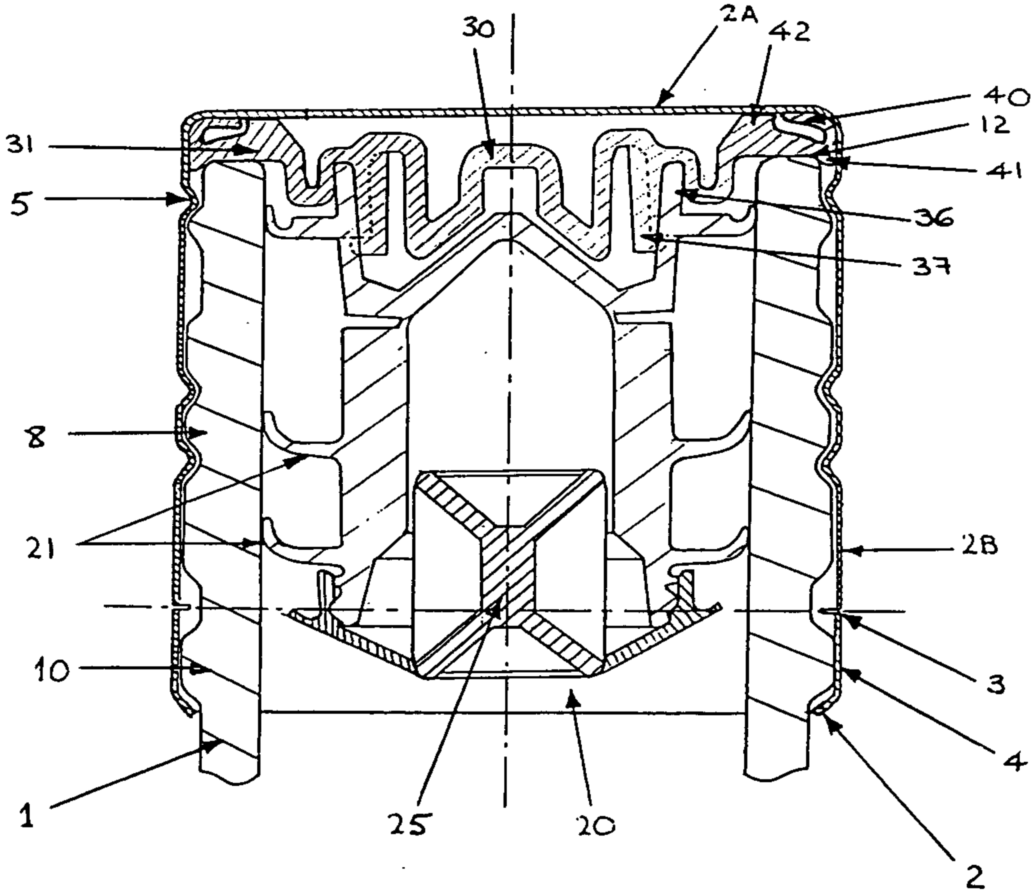


FIG. 5.

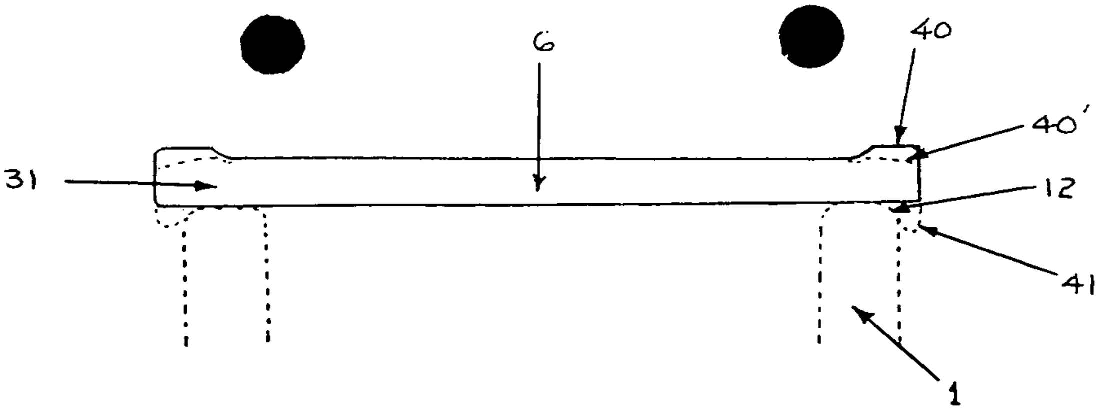


FIG. 6.

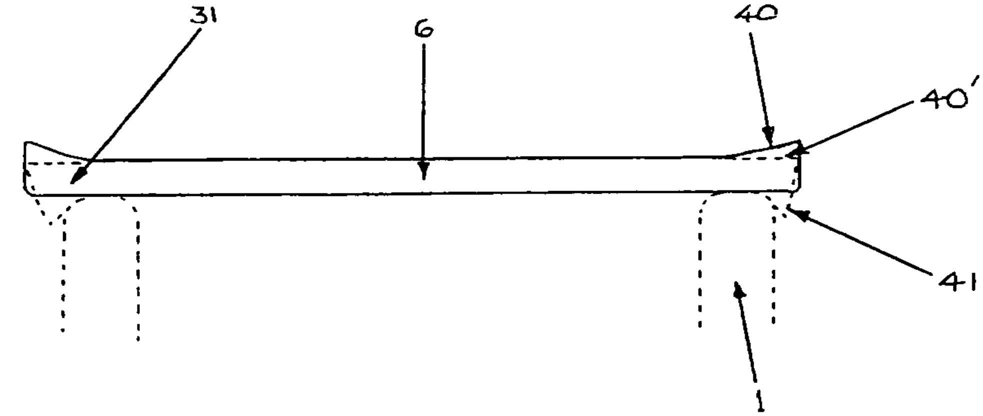


FIG. 7.

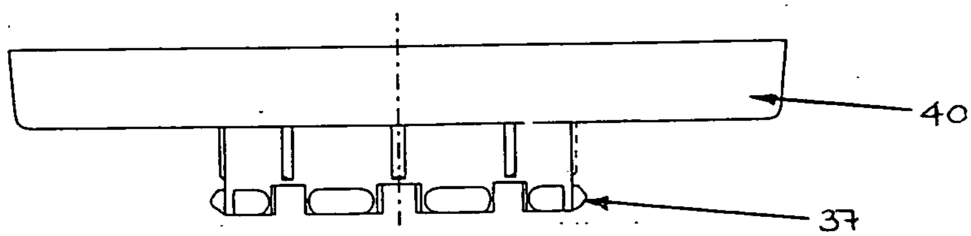


FIG. 8.

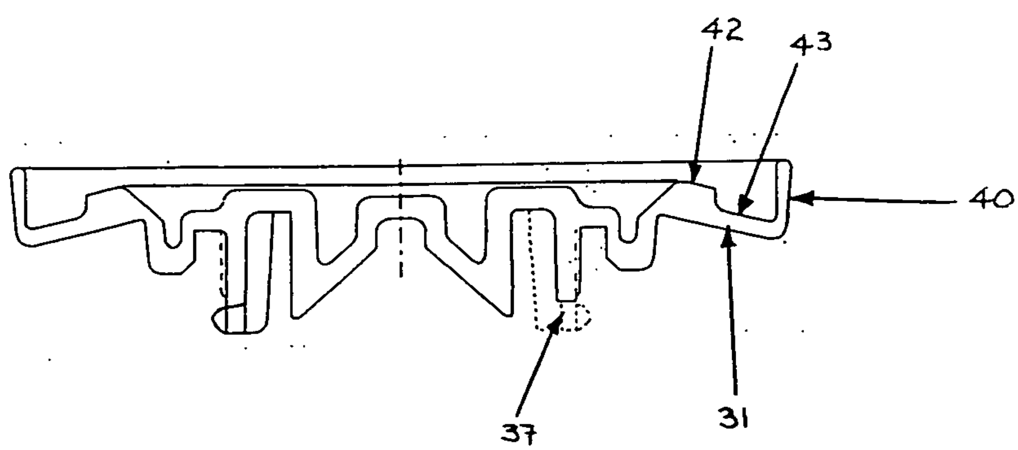


FIG. 9A

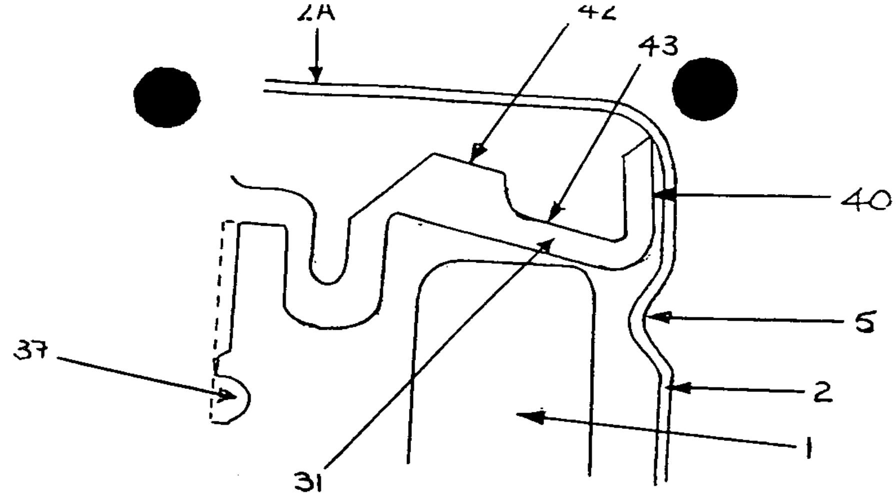


FIG. 9B

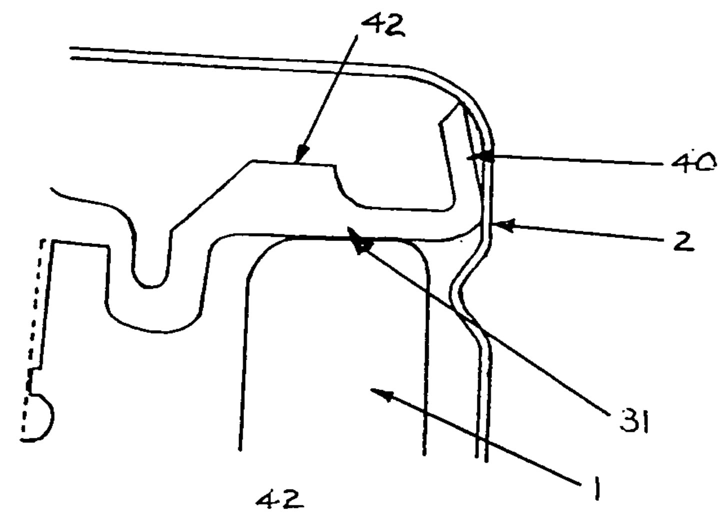


FIG. 9C

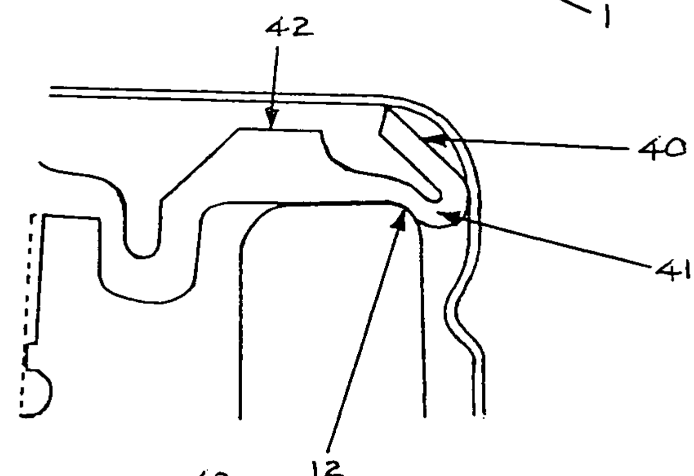
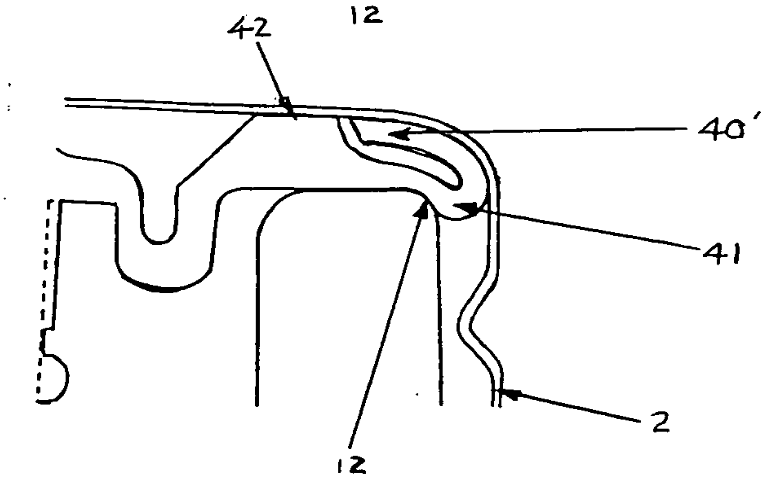


FIG. 9D.



PCT/GB00/00621

22/2/00 cp

Carnaudmetalbox Plc

THIS PAGE BLANK (USPTO)